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William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554

June 7, 1995

Re: CC Docket No. 92-297, RM-7872, RM-7722
IC Docket No. 94-31 ✓
Ex Parte Presentation

Dear Mr. Caton:

Representatives of Hughes Communications Galaxy, Inc. ("Hughes") met today with Commission representatives to discuss matters related to the Commission's pending proceedings in CC Docket No. 92-297 and IT Docket No. 94-31. The Hughes representatives were Edward J. Fitzpatrick of Hughes, Roger LeClair of Hughes Space and Communications Company, Edward E. Reinhart, consultant to Hughes, and the undersigned, counsel for Hughes. The Commission was represented by Thomas S. Tyocz, Harold J. Ng, Donna Bethea, and Jennifer M. Gilsenan. The enclosed materials formed the basis for the discussions.

An original and two copies of this letter are enclosed. Copies of this letter are being provided simultaneously to the Commission representatives identified above.

Respectfully submitted,

John P. Janka

Enclosures

HUGHES

**Presentation to the
Federal Communications Commission**

**Co-directional Sharing Between
GSO FSS and NGSO MSS Feeder Links at Ka Band**

Hughes Communications Galaxy, Inc.

June 7, 1995

BACKGROUND

- During in-line events,* unacceptable mutual interference between GSO FSS and NGSO systems occurs on all four interference paths.
 1. NGSO → GSO uplink
 2. GSO → NGSO uplink
 3. NGSO → GSO downlink
 4. GSO → NGSO downlink
- At least six independent sharing studies have shown that interference on all four paths can be mitigated by avoiding in-line events.

* When the NGSO satellite passes close to the line from a GSO satellite to either a NGSO earth station or a GSO earth station.

GENERAL RESULTS

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- The most effective means of avoiding interference during an in-line event is to shift traffic on the NGSO link either to an alternate NGSO satellite (satellite diversity) or to an alternate NGSO earth station (site diversity) or to both (path diversity).
- These techniques are effective for GSO FSS earth stations as small as 66cm (1 degree beam) and with co-located GSO and NGSO earth stations.
- The basic capability for implementing the path diversity techniques is already included in the design of NGSO MSS systems and will be exercised many times a day in normal operations (e.g., “hand off”)
- Exclusion zones (excluding GSO FSS earth stations from a geographic area around a NGSO earth station) do not avoid in-line events in two of the four interference paths.

SPECIFIC RESULTS

- **Spaceway-Iridium.** Path diversity (site diversity and/or satellite diversity) are effective even with the demanding Iridium interference objective. Automatic power control (APC) can reduce the required site diversity separations.
- **Spaceway-Odyssey.** Site diversity, made possible by the three tracking antennas on the Odyssey satellite, is the most effective solution.

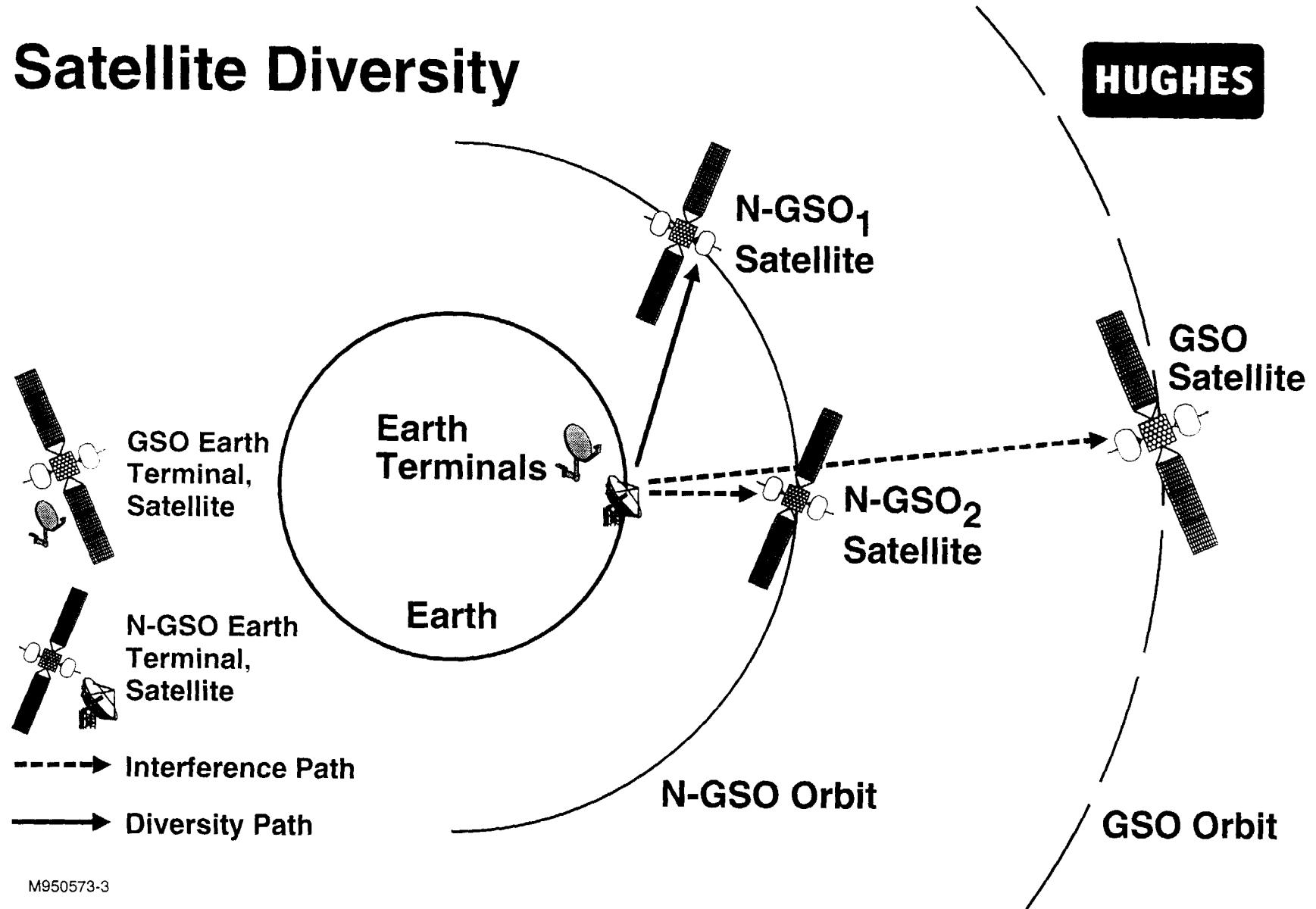
REACTION OF NGSO APPLICANTS

- All parties agree on the technical effectiveness of the diversity techniques.
- Motorola and TRW have indicated that while technically feasible, these techniques are not economically practical.
- All parties have questioned the impact of multiple GSO/FSS.
- Hughes has continued in-house studies to extend previous results and deal with NGSO concerns.

CONCLUSION

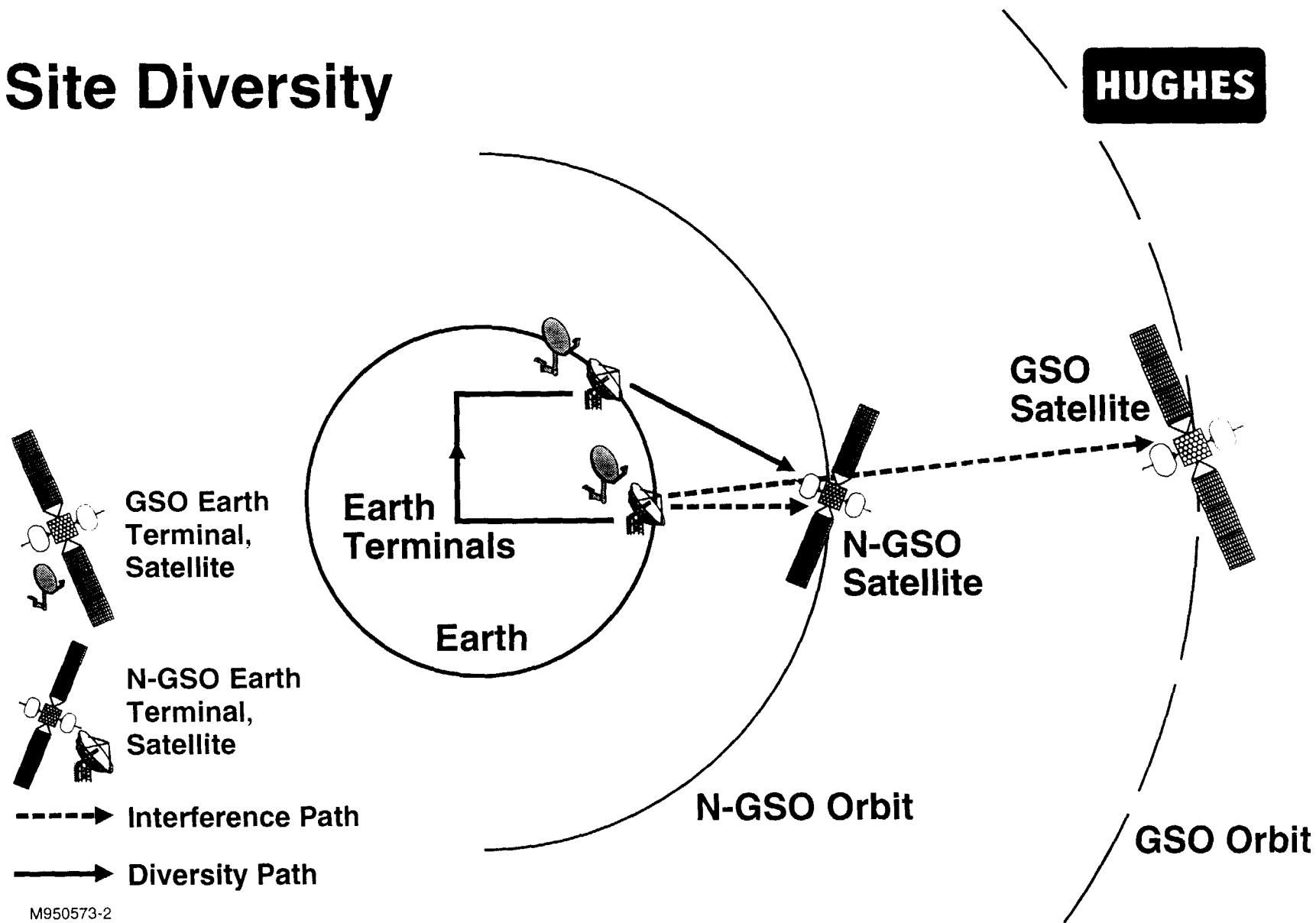
- All NGSO networks are inherently capable of using path diversity techniques to solve all GSO/NGSO interference problems.
- Sharing is feasible between GSO FSS networks and NGSO MSS feeder links only if NGSO systems implement these operational techniques.
- The following rule is proposed: in the frequency band xx.xx to yy.yy GHz, whenever an NGSO satellite link causes or receives interference exceeding the limits specified in [Sec. 3.1.2 of the CPM-95 Report] it will transfer traffic on that link to an alternate path (different NGSO satellite and/or NGSO earth station) which does meet these interference requirements.

Satellite Diversity



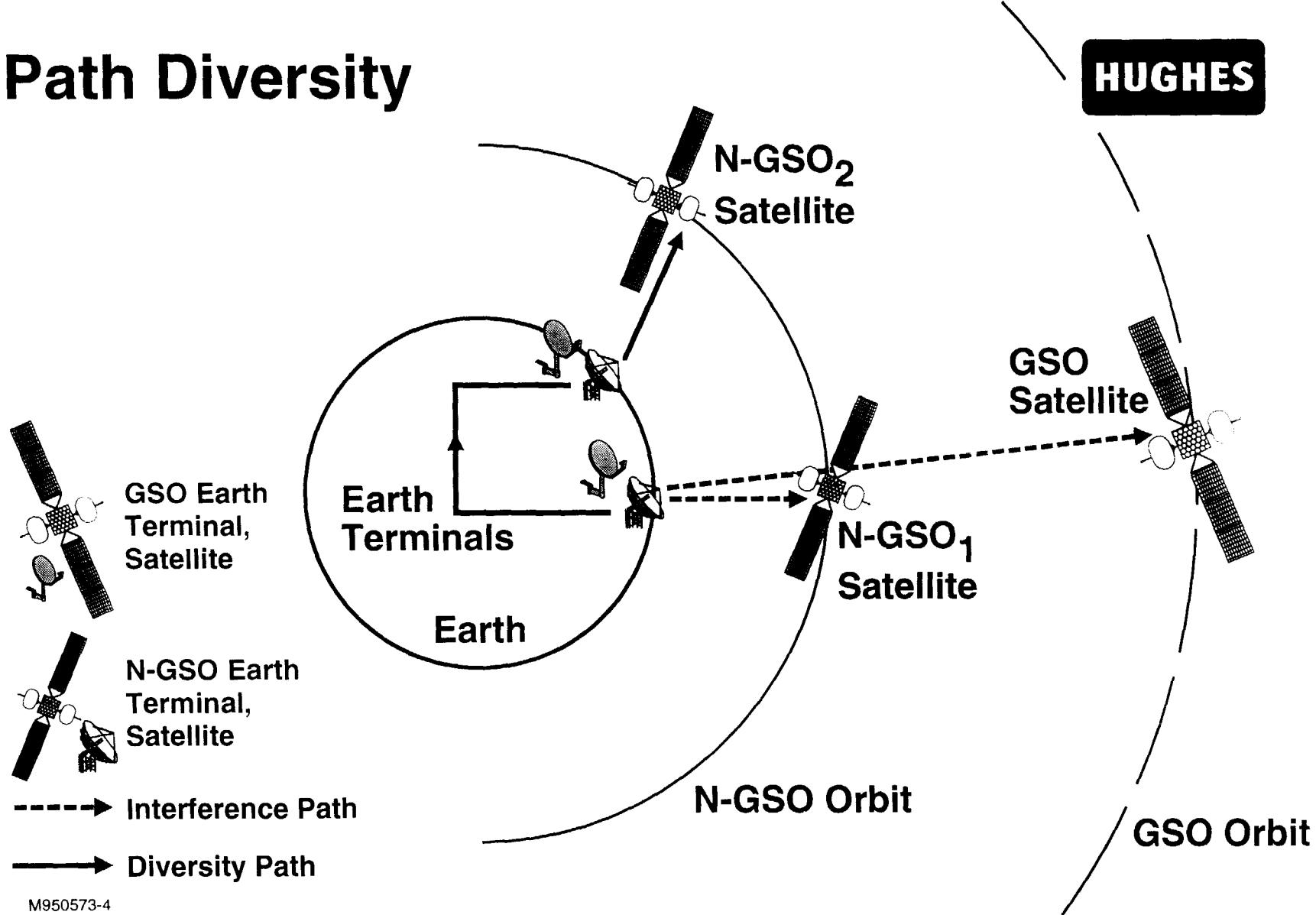
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Site Diversity



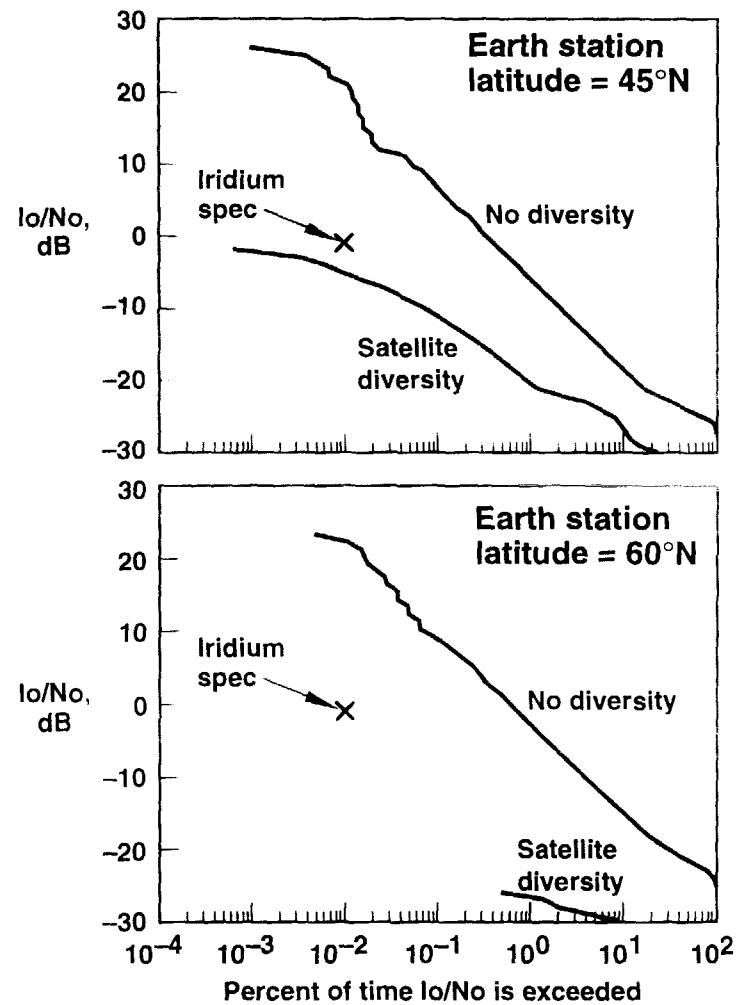
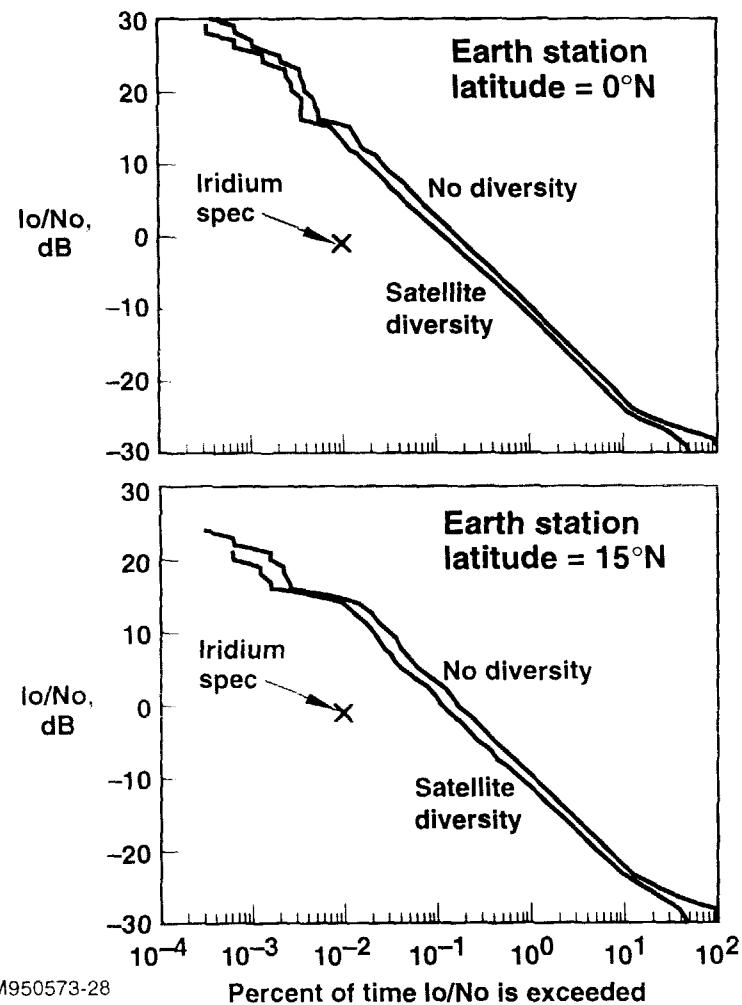
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Path Diversity



Spaceway Into Iridium Uplink Using Satellite Diversity

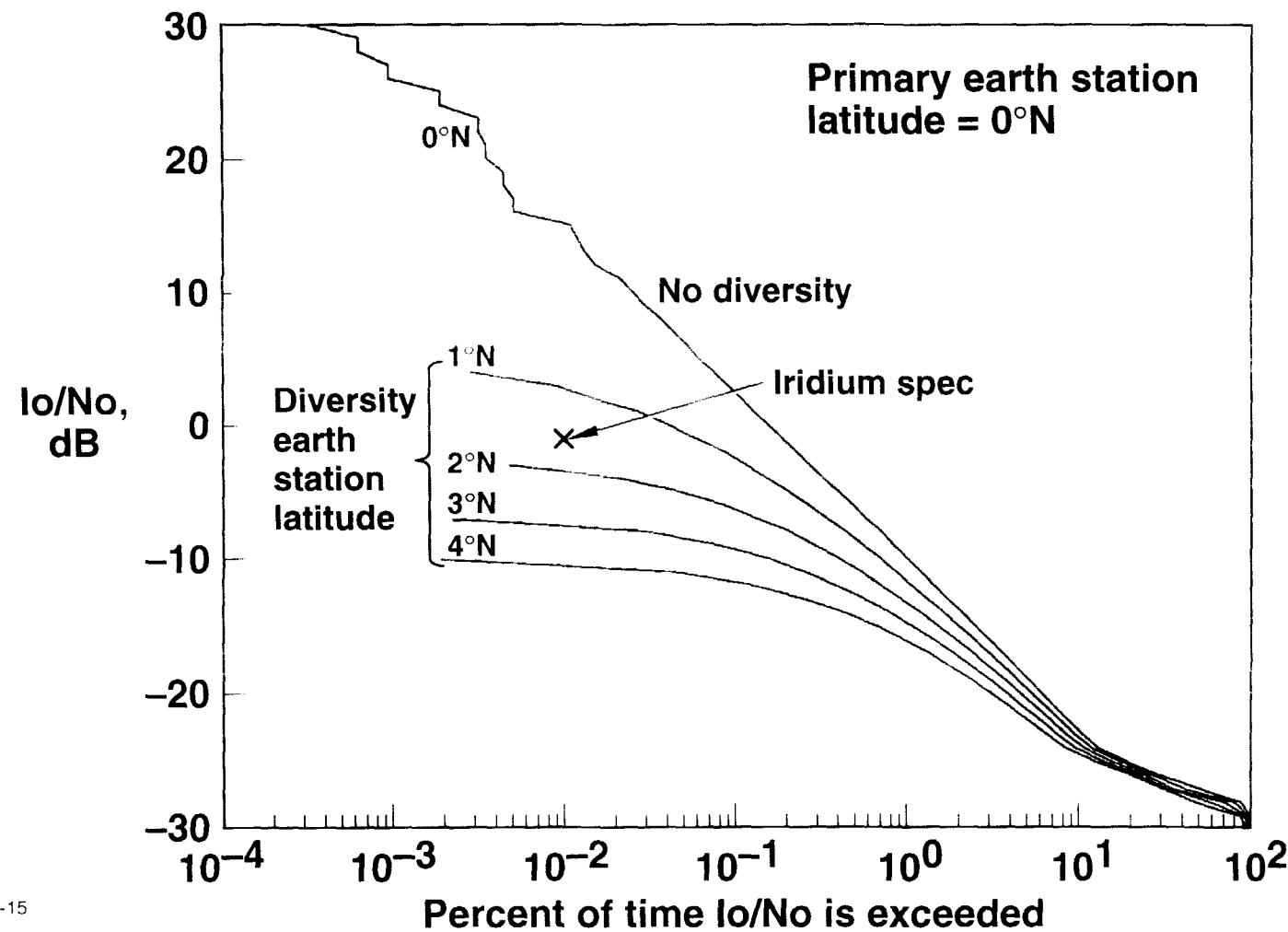
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Spaceway Into Iridium Uplink Using Site Diversity

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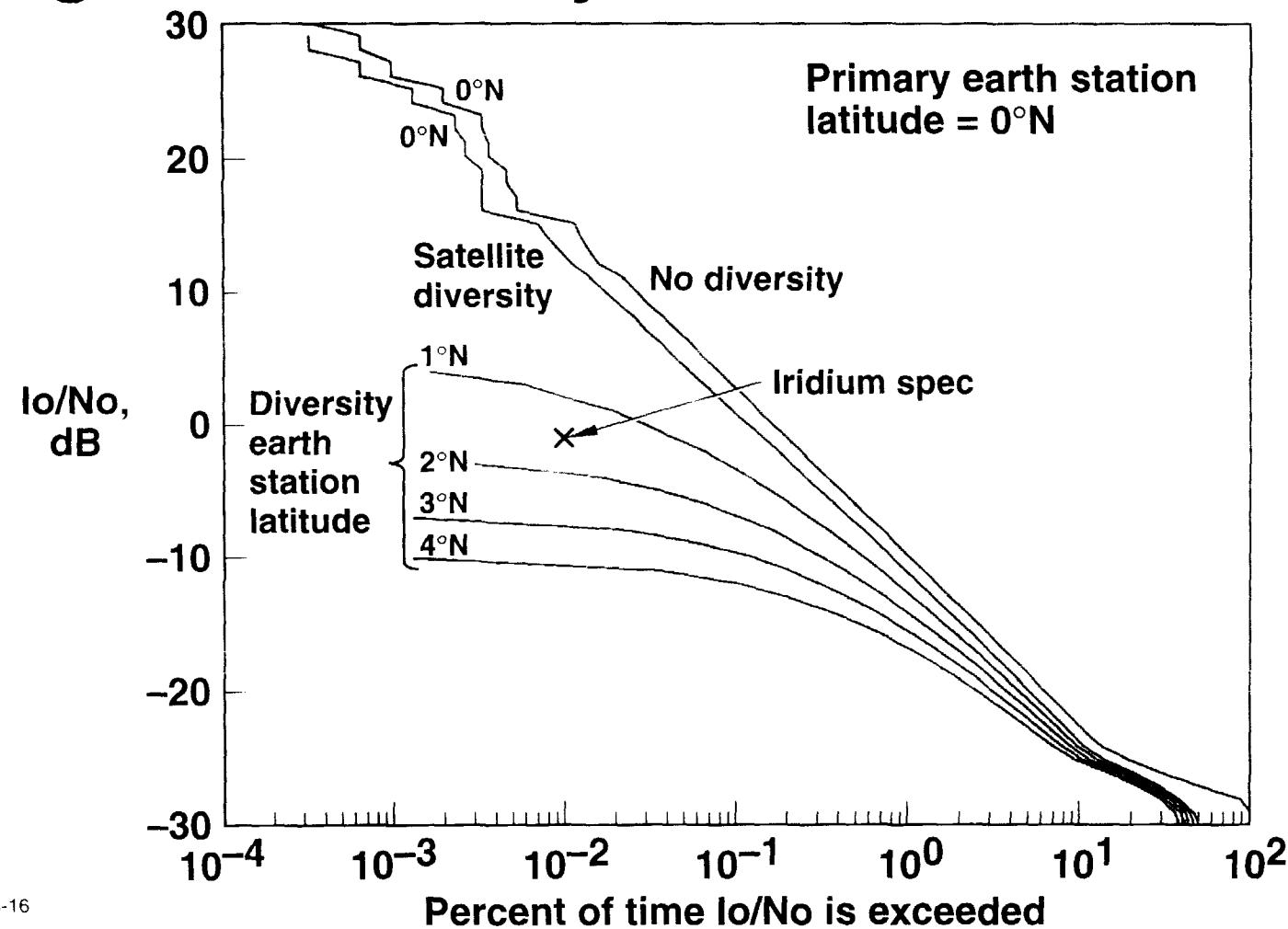


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Spaceway Into Iridium Uplink Using Path Diversity

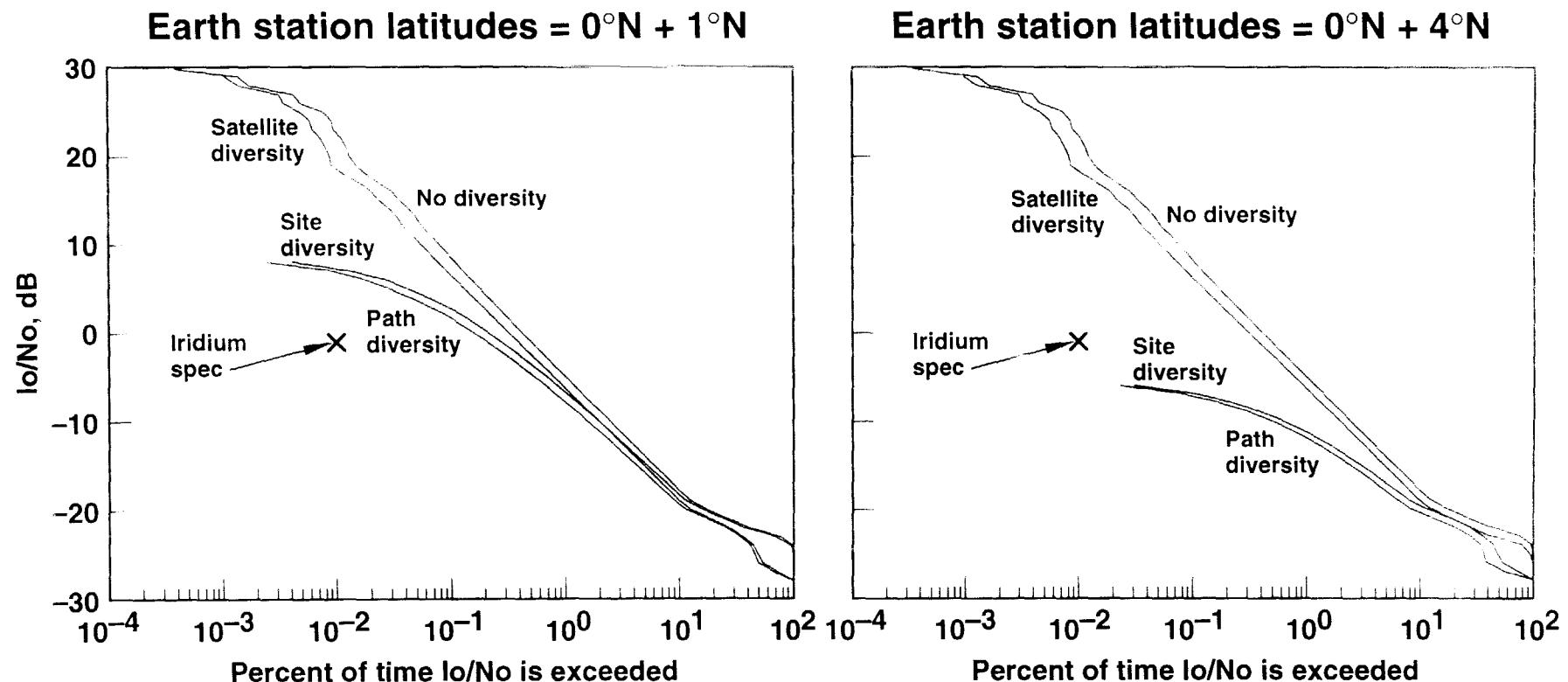
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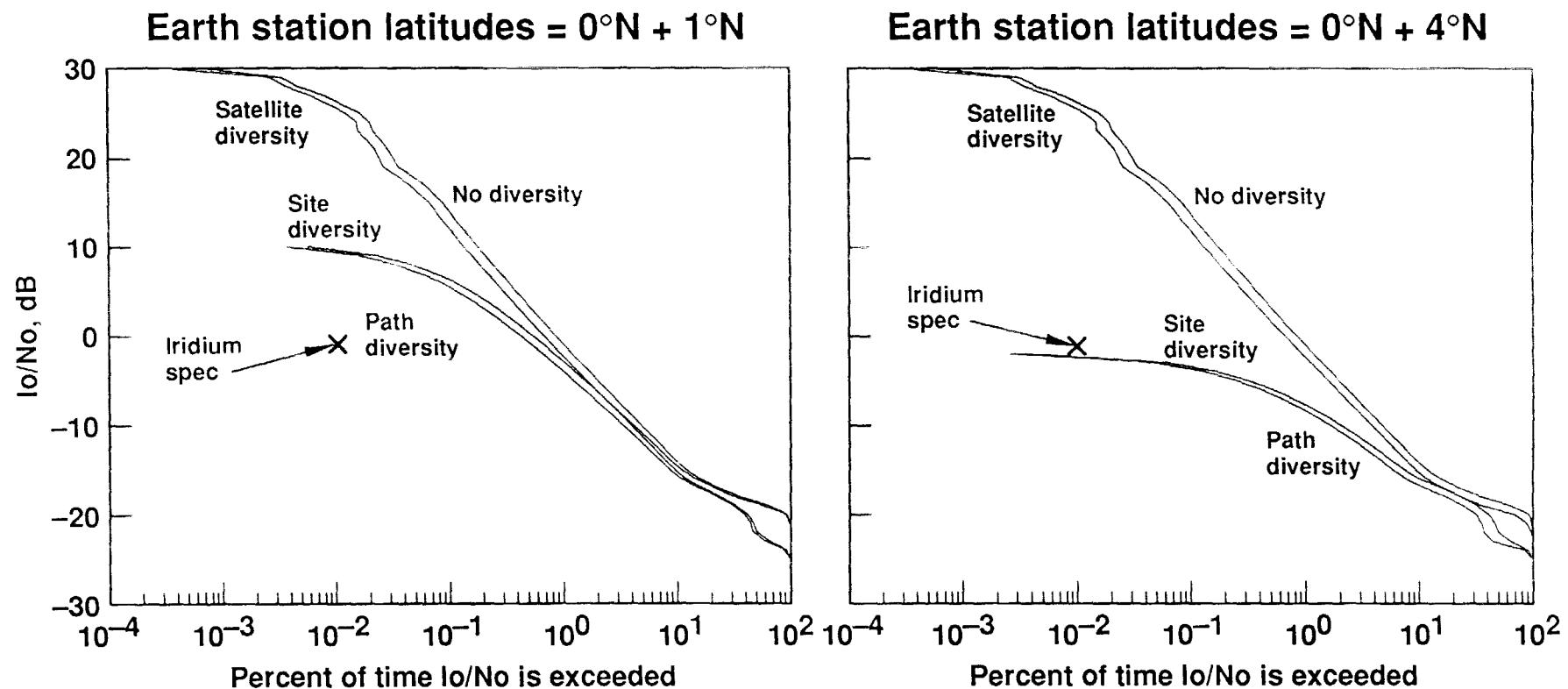
Spaceway Into Iridium Uplink— 3 GSO Satellites at 2° Spacing

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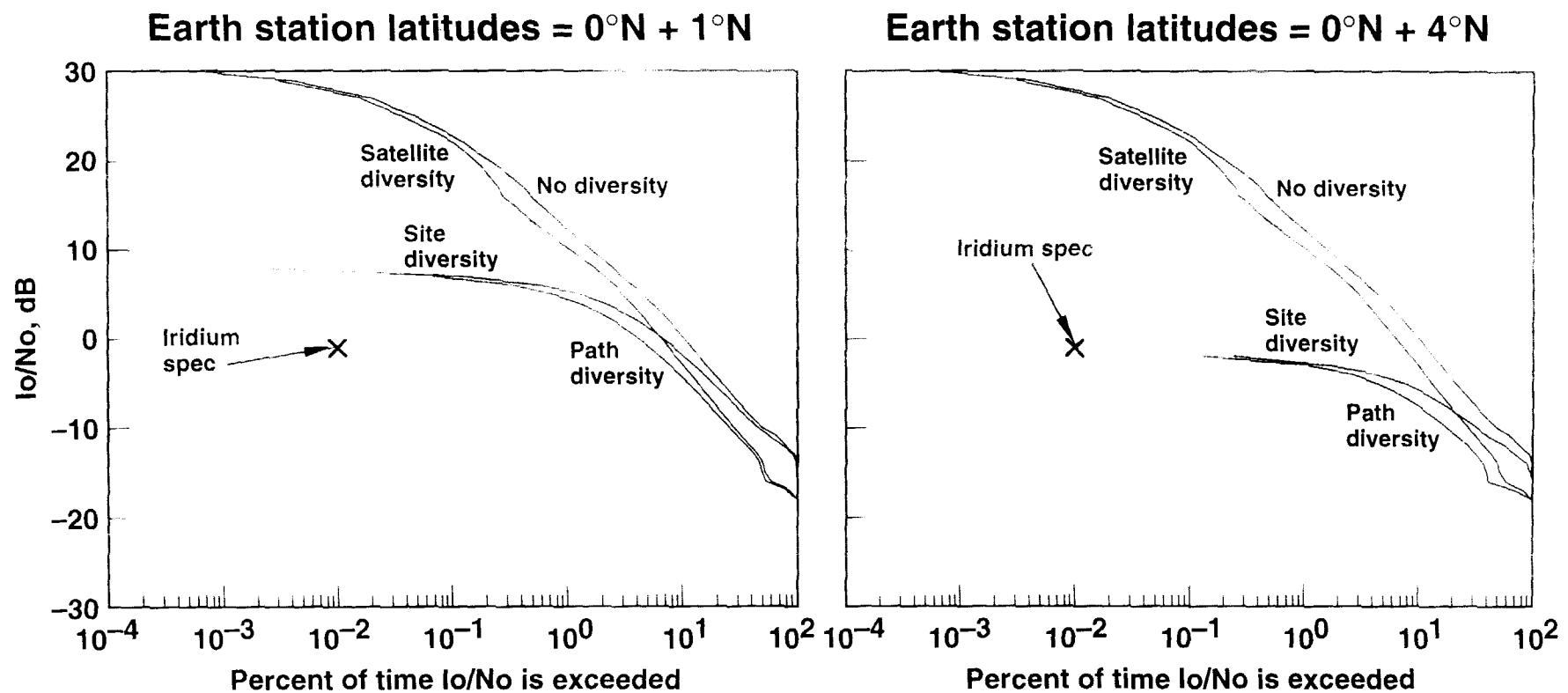
Spaceway Into Iridium Uplink— 7 GSO Satellites at 2° Spacing

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Spaceway Into Iridium Uplink— 31 GSO Satellites at 5° Spacing

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Iridium Into Spaceway Downlink

(Primary Earth Station Latitude = 0°N,
Diversity Earth Station Latitude = 1°N)

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